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## SYSTEM AND METHOD FOR DIAGNOSING AND PRESCRIBING CARE FOR REMOTE PERSON'S SKIN BY THE INTERNET

### Technical Field

5       The present invention relates to system and method for diagnosing and prescribing care for a remote person's skin by the Internet, capable of not only diagnosing and managing customer skin states but also recommending cosmetics and external applications most proper for the customers' skin and providing skin beauty guides for the customers.

### 10       Background Art

It can be said that all people want to have a beautiful and healthy skin. However, as a person grows older, the person's skin also ages, so that various functional and structural changes appear in the person's skin.

15       Internal and external stress such as age and ultraviolet rays reduce elasticity and moistness of and produce wrinkles in human skin. These phenomena are caused mainly due to loss of moisture in the skin, loosening of horny layer, slowdown of differentiation of epidermal cells, and deterioration of biosynthetic functions of intercellular substance and protein by fibroblast in the dermis. In other words, due to loss of biologic bound water, deterioration of dermal metabolism, reduction of dermal cells, reduction of intercellular  
20       substance, etc., the interior of the skin becomes depressed like a flat ball, and valleys are formed on the skin, thereby forming wrinkles. That is, the wrinkles or the degree of skin's aging is determined by the quantity of synthesized ExtraCellular Matrix(ECM) and activity of dermal cells, the quantity of biologic bound water in a skin, etc.

25       Therefore, in order to reduce wrinkles on a skin and prevent the skin from aging, the skin should be kept moist and protected from external stimulus. Moreover, it is preferable to activate the dermal cells, promote synthesis of bioprotein such as collagen and elastin, and fill the synthesized bioprotein in the depressed portions of dermis and epidermis.

30       The basic object of cosmetics is to delay this aging phenomenon of a skin as long as possible and maintain the skin as cleanly as possible. In general, a normal healthy person repeatedly uses cosmetics for long time, in order to keep his or her skin clean and healthy. Cosmetics is used by many and unspecified persons, and users of the cosmetics themselves determine a method of using the cosmetics. Therefore, cosmetics should secure absolute safety. However, external preparations including cosmetics may cause troubles on skin, such as acute contact dermatitis, irritant dermatitis, allergic contact dermatitis, phototoxic  
35       dermatitis, photoallergic contact dermatitis, a subjective stimulated feeling which causes displeasure on skin without any detection of inflammation or contact urticaria by the naked

eye, change of skin color, local adverse reaction, and systemic adverse reaction.

Therefore, due to such various side effects as described above, a user has to select proper cosmetics or a proper external preparation for skin according to the user's current skin state and various environmental conditions. A conventional skin diagnosis system shown in FIG. 1 includes a skin examination sensor 1 which examines skin and outputs analog examination data, a data processor 2 which receives the analog examination data from the skin examination sensor 1, transforms the analog examination data into digital data, and displays the digital data on a digital display (not shown) or an analog display (not shown) of the data processor 2, and a personal computer 3 which receives the digital data from the data processor 2, transforms the digital data into skin examination data, and manages and displays the skin examination data on a screen of the personal computer 3.

Although the conventional skin diagnosis system having the construction described above enables a skin to be exactly examined, the high price of the conventional skin diagnosis system makes it difficult to spread the conventional skin diagnosis system among ordinary consumers but allows the conventional skin diagnosis system to be used mainly in a cosmetic specialty store or hospital. As a result, consumers have to visit the cosmetic specialty store or hospital in order to examine their skin.

FIG. 2 shows another conventional skin diagnosis system which includes a consumer personal computer 4 having input and output devices, and a synthetic management server 7. The synthetic management server 7 constructs a synthetic database 5 for skin diagnosis and management, and provides data of the synthetic database 5 through a web browser provided by a web server 6. The synthetic management server 7 and the consumer personal computer 4 are connected with each other through the Internet network 8.

In this conventional skin diagnosis system having the construction described above which utilizes the Internet network, data for diagnosing an examinee's skin are made on the basis of a normal skin state without considering seasonal and individual skin characteristics, that is, on the basis of a skin state under a normal physical conditions in spring and autumn, and the diagnosis for the skin state progresses in question and answer form by means of a simple comparison with the data made as described above. Therefore, it is difficult to expect the latter conventional skin diagnosis system to produce an exact and proper prescription.

#### Disclosure of the Invention

Therefore, the present invention has been made in view of the above-mentioned problems, and it is an object of the present invention to provide system and method for diagnosing and prescribing care for a remote person's skin by the Internet, by which users do not have to visit a cosmetic specialty store or hospital but can purchase the skin examination

devices at a low price, so as to easily obtain exact diagnosis for their skin states whenever they want and receive various skin beauty information.

In the system and method for diagnosing and prescribing care for a remote person's skin by the Internet according to the present invention, skin examination devices and analysis  
5 devices are separated from each other, and the skin examination devices are connected with user computers, so as to examine users' skin states, while the analysis devices are connected with the manager server, which is connected with the user computers through the Internet network, so as to receive skin examination data and store the skin examination data in a database section of the manager server. The manager server compares user information data  
10 and the skin examination data with each other and analyzes them, so as to diagnose the users' skin states in real time and recommend proper cosmetics, external applications, etc., according to the diagnosis.

According to an aspect of the present invention, there is provided a system for diagnosing and prescribing care for a remote person's skin by the Internet; the system  
15 comprising: at least one skin examination system including a plurality of skin examination sensors and an examination module, the skin examination sensors examining a user's skin state and generating skin examination signals, the examination module receiving and processing the skin examination signals; at least one user computer system capable of receiving the skin examination signals and transmitting the skin examination signals through  
20 the Internet; and a manager system including a web server which processes requests from users, a database section which analyzes and stores previously inputted user information data and the skin examination data transmitted from the user personal computers, a plurality of the analysis devices which analyze the skin examination signals provided by the examination module, and a plurality of the skin beauty servers which compare and analyze the user  
25 information data and the skin examination data, thereby providing the user with information in relation to skin beauty.

In this case, the skin examination sensors may include a moisture measurement sensor for measuring moisture in the skin, a fat measurement sensor for measuring fat in the skin, an elasticity measurement sensor for measuring elasticity of the skin, a melanin-  
30 erythema measurement sensor for measuring a degree of melanin and erythema on the skin, a PH measurement sensor for measuring a PH value of the skin, and a skin magnifier sensor for examining a state of the skin or hair by means of a magnifying lens.

Further, it is preferred that the database section comprises a user information database which contains information about the users, a skin examination database which  
35 contains users' skin examination data provided by the analysis devices, a skin beauty database which contains skin beauty-related information provided by the skin beauty servers, and a

synthetic analysis database which contains data obtained by synthetically analyzing the user information database, the skin examination database, and the skin beauty database, thereby providing the users with information about selection of cosmetics, skin beauty management, and external preparations for skin.

5           According to another aspect of the present invention, there is provided a method for diagnosing and prescribing care for a remote person's skin by the Internet, the method being performed by means of a system comprising at least one skin examination system, at least one user computer system, a manager server, and a plurality of analysis devices, the skin examination system including a plurality of skin examination sensors and an examination  
10   module, the user computer system including a user personal computer, the examination module processing the skin examination signals from the skin examination sensors, the manager server analyzing, storing, and transmitting data transmitted from the user computer system, the analysis devices being connected with the manager server and converting the skin examination signals to skin examination data, the method comprising the steps of: (a)  
15   connecting the skin examination sensors with the user personal computer, so as to try to connect with the manager server; (b) judging whether a user is a member of service or not; (c) requiring the user to join the membership when the user is not a member of the service, and judging whether the user wants to examine user's skin or not when the user is a member of  
20   the service; (d) providing the user with user's manuals about the skin sensors when a request for an examination for user's skin from the user is confirmed; (e) carrying out the examination for the user's skin according to the user's manuals; (f) transmitting the skin examination signals to the manager server; (g) converting the skin examination signals into skin examination data in the analysis devices connected to the manager server; (h) storing the skin examination data in a database section; (i) analyzing the skin examination data in the  
25   manager server; (j) determining whether the analyzed skin examination data exceeds a reference value or not; (k) requiring a re-examination for the skin and providing the user's manuals for the skin sensors again when the analyzed skin examination data exceeds a reference value, and processing and extracting the skin examination data stored in the database section, so as to construct a data warehouse, when the analyzed skin examination  
30   data does not exceed a reference value; (l) incorporating and comparing the skin examination data with existing examination data and analyzing them, so as to extract resultant information data; and (m) providing the user with the resultant information data.

          In this case, in order to enable the user to join the membership, step c may further comprises the steps of: requiring the user to join the membership and providing the user with  
35   information in relation to the joining of the membership; determining whether new subscriber information in order to join the membership is inputted or not; requiring the user again to

input the new subscriber information when an input of the new subscriber information is not confirmed, and storing the new subscriber information in the database section when new subscriber information has been inputted; arranging and classifying the new subscriber information data stored in the database section; comparing and analyzing the arranged and classified new subscriber information data with existing subscriber information data, so as to apply it to a model obtained through factor analysis; predicting the new subscriber's skin type with reference to the applied model; providing the new subscriber with custom-made information according to the predicted skin type; determining whether the new subscriber has inputted detail items or not; and providing information about the detail items and storing the detail items again in the database section when an input of the detail items is confirmed, and renewing the model obtained through factor analysis into a new model by incorporating the new subscriber information data with the existing subscriber information data when the input of the detail items is not confirmed.

Further, it is preferred that the method further comprises the steps of: when a request for skin examination from the user is not confirmed, providing the user with information proper for the user by means of existing skin examination data; determining whether or not the provided information is information which the user wants to get; allowing the user to purchase goods from various service companies when the information is the information which the user wants to get, and requiring the user to examine various portions of the user's skin again and executing a re-examination of the skin when the information is not the information which the user wants to get; storing data obtained from the re-examination of the skin in the database section; and providing the user with information suitable for the user with reference to the data stored in the database section, so as to enable the user to purchase goods from various service companies.

It is also preferred that, in relation to management of the data warehouse, the method further comprises the steps of: collecting fundamental data, the fundamental data including data collected according to external specialists' opinions, data inputted through the skin examination sensors, data which represent fat content, moisture content, and PH, according to skin types, and data of environmental factors such as season, weather, temperature, and moisture, which have influence on the fat content, moisture content, and PH; carrying out data mining which includes data extraction, data conversion, data refinement, and data synthesis, on the basis of the collected fundamental data; constructing a data warehouse by relating the data-mined datas with each other so that the datas can be efficiently controlled and managed; obtaining a final resultant value through a cross analysis and a discrimination analysis of the datas constructed in the data warehouse; utilizing information, which includes methods of caring skin and selecting kinds of cosmetics according to the user skin types, in skin care by

the users and marketing by manufacturers of cosmetics, with reference to the final resultant value obtained through the above analyses; and for various users, adding and renewing data, and deleting unnecessary data, so as to store resultant data in the database section.

## 5           Brief Description of the Drawings

The foregoing and other objects, features and advantages of the present invention will become more apparent from the following detailed description when taken in conjunction with the accompanying drawings in which:

FIG. 1 is a schematic block diagram of a conventional skin diagnosis system;

10           FIG. 2 is a schematic block diagram of another conventional skin diagnosis system;

FIG. 3 is a schematic block diagram of a system for diagnosing and prescribing care for a remote person's skin by the Internet according to the present invention;

FIG. 4 is a flow chart of a method for diagnosing and prescribing care for a remote person's skin by the Internet according to the present invention;

15           FIG. 5 is a flow chart of encircled A portion in FIG. 4;

FIG. 6 is a flow chart of encircled B portion in FIG. 4; and

FIG. 7 is a flow chart for describing management of a data warehouse according to the present invention.

## 20           Best Mode for Carrying Out the Invention

Reference will now be made in detail to the preferred embodiments of the present invention.

FIG. 3 is a block diagram of a system for diagnosing and prescribing care for a remote person's skin by the Internet according to the present invention, which includes a  
25           manager server 100, a plurality of user personal computers 200, and a plurality of skin examination devices 300 each of which is connected to each of the user personal computers 200.

The user personal computers 200 and the manager server 100 are connected with each other through the Internet network 400.

30           The skin examination device 300 includes a plurality of skin examination sensors 310 capable of examining various factors indicating a user's skin state, such as quantity of moisture, quantity of fat, PH value, and elasticity, and an examination module 320 which receives various skin examination signals from the skin examination sensors 310 and subjects the skin examination signals to various processes including an analog/digital (A/D)  
35           conversion, an amplification, a damping, and other controls.

The skin examination sensors 310 may include a moisture measurement sensor for



measuring moisture in the skin, a fat measurement sensor for measuring fat in the skin, an elasticity measurement sensor for measuring elasticity of the skin, a melanin-erythema measurement sensor for measuring a degree of melanin and erythema on the skin, a PH measurement sensor for measuring a PH value of the skin, and a skin magnifier sensor for examining a state of the skin or hair by means of a magnifying lens.

The examination module 320 synthetically controls the skin examination sensors 310 according to various measurement standards, thereby obtaining desired skin examination signals.

The manager server 100 includes a web server 110 which processes requests from users, a database section 120 which analyzes and stores skin examination data and user information data transmitted from the user personal computers 200, a plurality of the analysis devices 130 which analyze the skin examination signals provided by the examination module 320, and a plurality of the skin beauty servers 140 which compare and analyze the skin examination data and the user information data, thereby providing the users with information in relation to skin beauty.

In the meantime, system for diagnosing and prescribing care for a remote person's skin through the Internet according to the present invention may further include an A/D converter or a D/A converter disposed between the analysis devices 130 and the manager server 100, when the analysis devices 130 is only one type of analog devices and digital devices.

The database section 120 includes a user information database 121 which contains all information of users, a skin examination database 122 which contains users' skin examination data provided by the analysis devices 130, a skin beauty database 123 which contains the skin beauty related information provided by the skin beauty servers 140, and a synthetic analysis database 124 which contains data obtained by synthetically analyzing the user information database 121, the skin examination database 122, and the skin beauty database 123, thereby enabling the users to be provided with necessary information.

FIG. 4 is a flow chart of a method for diagnosing and prescribing care for a remote person's skin by the Internet according to the present invention. In the method, at first, various skin examination sensors 310 are connected with the user personal computers 200 (step S100). That is, regardless of whether a user is a registered member or not, the user can purchase the skin examination device 300 distributed at a low price in the market and connect the skin examination device 300 with the user personal computers 200 already installed in the user's home, so as to examine the user's skin. After the skin examination device 300 is connected with the user personal computers 200, the user can try to connect with the web server 110 of the manager or a Web site of a company providing the service (step S110).

Then, whether the user is a member of service provided by the system and method according to the present invention or not is judged (step S120). When the user is not a member of the service, the user is requested to join the membership (step S121) and is provided with information in relation to the joining of the membership (step S122), as shown in FIG. 5. Then, whether new subscriber information in order to join the membership is inputted or not is determined (step S123). When an input of new subscriber information is not confirmed, the user is requested again to input new subscriber information in order to join the membership (step S121). When an input of new subscriber information is confirmed, the inputted new subscriber information is stored in the database section 120 (step S124), and the new subscriber information data stored in the database section 120 is arranged and classified (step S125). Then, the arranged and classified new subscriber information data is analyzed through a comparison with existing subscriber information data, and then is applied to a model obtained through a factor analysis (step S126). Thereafter, the new subscriber's skin type is predicted with reference to the applied model (step S127), and custom-made information according to the predicted skin type is provided for the new subscriber (step S128). Next, whether the new subscriber has inputted detail items or not is determined (step S129). When an input of detail items is confirmed, information about the detail items is provided (step S130), and the inputted detail items are stored again in the database section 120 (step S124). In contrast, when an input of detail items is not confirmed, the new subscriber information data is incorporated with the existing subscriber information data, so as to renew models (step S131).

When the user is judged as a member of the service in step S120, whether the user wants to examine his or her skin or not is determined (step S135). When a request for skin examination from the user is not confirmed, that is, when the user is a member of the service but does not want to examine his or her skin, custom-made information is provided for the user with reference to the existing skin examination data (step S136). Then, whether or not the provided custom-made information is information which the user wants to get is determined (step S137). When the information is the information which the user wants to get, the user is enabled to purchase goods from various service companies (step S138). In contrast, when the information is not the information which the user wants to get, it is requested that various portions of the user's skin should be examined again (step S139), and a re-examination of the skin is executed (step S140). Data obtained from the re-examination of the skin is stored in the database section 120 (step S141), and information suitable for the user is provided for the user with reference to the data stored in the database section 120 (step S142), and the user is enabled to purchase goods from various service companies (step S138).

When a request for an examination for the user's skin from the user is confirmed

through step S135, the web server 110 provides various user's manuals of various skin sensors (step S145), and the user carries out the examination for the user's skin according to the user's manuals (step S150). Then, various skin examination data signals obtained from the skin examination are transmitted to the manager server 100 (step S160), and the skin examination signals are transformed into skin examination data in the analysis devices 130 connected to the manager server 100 (step S170), which is then stored in the database section 120 (step S180). Next, the manager server 100 analyzes the skin examination data in the manager server 100 (step S190), and determines whether the analyzed skin examination data exceeds a reference value or not (step S200). When the analyzed skin examination data exceeds a reference value, a re-examination for the skin is requested (step S210), and the web server 110 provides the user's manuals of the skin sensors again (step S145). In contrast, when the analyzed skin examination data does not exceed a reference value, the skin examination data stored in the database section 120 are processed and extracted to thereby construct a data warehouse (step S220), and the skin examination data are analyzed in comparison with existing examination data, so that resultant information data are extracted (step S230), and skin beauty-related information such as guides for selection of cosmetics, guides for skin care, information about external skin preparations, etc., are provided for the user (step S240).

FIG. 7 shows a flow chart of managing the data warehouse. In managing the data warehouse, at first, fundamental data are collected (step S300). In this case, the fundamental data include data collected according to external specialists' opinions, data inputted through the skin examination sensors, data which represent fat content, moisture content, and PH, according to skin types, and data of environmental factors such as season, weather, temperature, and moisture, which have influence on the fat content, moisture content, and PH. Next, data mining, which includes data extraction, data conversion, data refinement, and data synthesis, is carried out on the basis of the collected fundamental data (step S310). That is, in the data extraction procedure, the data of environmental factors are extracted through main component analysis from the collected fundamental data. In the data conversion procedure, data of fat content, moisture content, and PH are grouped according to skin types through group analysis. In the data refinement procedure, data are refined according to probability distribution. In the data synthesis procedure, data are synthesized on the basis of reference values variably set by means of the user's personal information. Next, a data warehouse is constructed by relating the data-mined datas with each other so that the datas can be efficiently controlled and managed (step S320). Then, a final resultant value is obtained through a cross analysis and a discrimination analysis (step S330). In this case, in the cross analysis procedure, the datas constructed in the data warehouse are compensated by means of

the skin types according to the sensed internal and external states of the examined object. In the discrimination analysis procedure, characteristic values are obtained from the skin examination data, which have been inputted through various skin examination sensors, by means of compensation values and reference values(step S330).

5 Hereinafter, a more detailed description of the analysis procedures will be given under the following liminary assumption in order to aid understanding of the analysis procedures.

First, factors having influence on the user's skin state, information which can be obtained through examination, are as follows:

- 10 1) environmental factors (in order to keep the user's state uniform in the time of examination) such as seasons and weather;
- 2) the user's personal information (in order to obtain skin state characteristics according to the personal information) such as age, sex, being married or not, and job (indoor or outdoor);
- 15 3) user state information (in order to keep the user's state uniform in the time of examination) such as time passed after taking a shower, degree of makeup (high, middle, and low), time passed after exercising, time passed after drinking, and time passed after eating.

Second, medical reference values (mean values) for moisture, fat, and PH in a forehead of a common person are as follows, when the examination is performed under  
20 conditions of two hours after taking a shower, no makeup, three hours after exercising, twelve hours after drinking, and two hours after eating:

moisture of 55 to 65 g-sebum/cm<sup>2</sup>;  
fat of 100 to 200 g-sebum/cm<sup>2</sup>; and  
mean PH value of 4.3 to 5.5.

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(1) Hereinafter, the analysis for obtaining a variable reference value according to the user's personal information will be described.

1) Moisture: moisture decreases as a person grows older, women generally have more moisture than men, and indoor workers have more moisture than outdoor workers.

30 Moisture is estimated by the following equation 1, in which the value of the sex is zero for men or one for women, the value of the job is one for indoor workers or zero for outdoor workers, and e1 is  $N(0, 1.5^2)$ .

Equation 1

35 Moisture =  $60 - 0.01 \times \text{age} + 0.5 \times \text{sex} + 3 \times \text{job} + e1$

2) Fat: fat decreases as a person grows older, women generally have more fat than men, and indoor workers have more fat than outdoor workers.

Fat is estimated by the following equation 2, in which the value of the sex is zero for men or one for women, the value of the job is one for indoor workers or zero for outdoor workers, and  $e_2$  is  $N(0, 15^2)$ .

Equation 2

$$\text{Fat} = 150 - 0.5 \times \text{age} + 3 \times \text{sex} + 5 \times \text{job} + e_2$$

3) PH: PH decreases (more nervous) as a person grows older, women generally have less PH than men, and indoor workers have less PH (more nervous) than outdoor workers.

PH is estimated by the following equation 1, in which the value of the sex is zero for men or one for women, the value of the job is one for indoor workers or zero for outdoor workers, and  $e_3$  is  $N(0, 0.2^2)$ .

Equation 3

$$\text{PH} = 4.9 - 0.001 \times \text{age} + 0.02 \times \text{sex} + 0.1 \times \text{job} + e_3$$

(2) Hereinafter, estimation of compensation factors according to the environment and the user's state in the time of examination will be described.

1) Moisture: moisture increases when a person takes a shower, and decreases in some degree but is kept more for two hours after taking a shower than after two hours from the shower. Makeup helps moisture to be kept for long time, but the kept quantity of moisture shows difference according to the degree of the makeup. Drinking increases moisture. Moisture decreases in some degree but is kept more for twelve hours after drinking than after twelve hours from the drinking. Eating increases moisture. Moisture decreases in some degree but is kept more for two hours after eating than after two hours from the eating. Exercising decreases moisture. Moisture increases in some degree but is kept more for three hours after exercising than after three hours from the exercising. Moisture is kept most in summer and more in spring and autumn than in winter. Moisture is kept more in rainy days or snowy days than in cloudy days or shiny days.

Equation 4

Moisture compensation value = examination value - [shower effect(3)  $\times$  (2 hours - time from the shower to the examination) + makeup effect(0.5)  $\times$  {makeup level(high: 3, middle: 2, low: 1, no makeup: 0)} + drinking effect(0.1)  $\times$  (12 hours - time from the drinking to the

examination) + eating effect(1) × (2 hours – time from the eating to the examination) + exercising effect(-2) × (3 hours – time from the exercising to the examination)] – [season effect(2) × {spring or autumn(1), summer(2)} + weather effect(1) × {rainy or snowy days(1), cloudy days(0.5)}]

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In equation 4, data can be produced by means of “temperature” for the seasonal factor and “humidity” for the weather factor.

2) Fat: fat decreases when a person takes a shower, and increases in some degree but is kept less for two hours after taking a shower than after two hours from the shower. Makeup helps fat to be kept for long time, but the kept quantity of fat shows difference according to the degree of the makeup. Eating increases fat. Fat decreases in some degree but is kept more for two hours after eating than after two hours from the eating. Exercising increases fat. Fat decreases in some degree but is kept more for three hours after exercising than after three hours from the exercising.

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Equation 5

Fat compensation value = examination value - [shower effect(-10) × (2 hours – time from the shower to the examination) + makeup effect(10) × {makeup level(high: 3, middle: 2, low: 1, no makeup: 0)} + eating effect(5) × (2 hours – time from the eating to the examination) + exercising effect(10) × (3 hours – time from the exercising to the examination)] – [season effect(10) × {spring or autumn(1), summer(2)} + weather effect(5) × {rainy or snowy days(0), cloudy days(0.5), shiny days(1)}]

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3) PH: Eating increases PH. PH decreases in some degree but is kept more for two hours after eating than after two hours from the eating.

Equation 6

PH compensation value = examination value - {eating effect(-0.3) × (2 hours – time from the eating to the examination)}

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Here, let us assume that information about a user A in the time of performing the examination is as follows:

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personal information of man, age of 27, indoor worker;

state information of one hour after taking a shower, low makeup, three hours after

drinking, no exercising, and two hours after eating; and  
environmental factors of winter and rain.

On this assumption, reference values proper for the information of the user A can be obtained by means of equations 1 to 3 as follows:

- 5       moisture of 57.73 to 67.73 g-sebum/cm<sup>2</sup> obtained by equation 1;
- fat of 108.5 to 208.5 g-sebum/cm<sup>2</sup> obtained by equation 2; and
- mean PH value of 4.43 to 5.63 obtained by equation 3.

Also, compensation values for the examination values of the user A can be obtained by means of equations 4 to 6 as follows:

- 10     moisture compensation value of 53.6 g-sebum/cm<sup>2</sup> obtained by equation 4;
- fat compensation value of 210 g-sebum/cm<sup>2</sup> obtained by equation 5; and
- PH compensation value of 5.7 obtained by equation 6.

Then, utilizing statistical distance between the compensation values and the reference values obtained as described above, the discrimination analysis is carried out.

- 15       With reference to the final resultant value (that is, the examined person's skin type) obtained through the above analyses, information such as methods of caring skin and selecting kinds of cosmetics according to the user skin types is utilized in the skin care by the users and the marketing by manufacturers of cosmetics (step S340). For the diverse users, data are added and renewed, and unnecessary data are deleted (step S350). Then, the
- 20     resultant data are stored in the database section (step S360).

#### Industrial Applicability

- In the system and method for diagnosing and prescribing care for a remote person's skin by the Internet according to the present invention, skin examination devices and analysis
- 25     devices are separated from each other, and the skin examination devices are connected with user computers, so as to examine users' skin states, while the analysis devices are connected with the manager server, which is connected with the user computers through the Internet network, so as to receive skin examination data and store the skin examination data in a database section of the manager server. The manager server compares user information data
  - 30     and the skin examination data with each other and analyzes them, so as to diagnose the users' skin states in real time and recommend proper cosmetics, external applications, etc., according to the diagnosis. Therefore, the users do not have to visit a cosmetic specialty store or hospital but can purchase the skin examination devices at a low price, so as to easily obtain exact diagnosis for their skin states whenever they want and receive various skin
  - 35     beauty information.

Further, utilizing skin analysis data about various users which are accumulated by the

system and method according to the present invention, manufacturers can produce skin beauty-related goods most proper for the users' skin states, and sales companies can sell the skin beauty-related goods most proper for the users' skin states not on the spot but through the Internet, so as to reduce side expense and enlarge demand, thereby making larger profit.

- 5        While the present invention has been described in connection with what are presently considered to be the most practical and preferred embodiments, it is to be understood that the invention is not limited to the disclosed embodiments and the drawings, but, on the contrary, it is intended to cover various modifications and variations within the spirit and scope of the appended claims. For example, such devices as the skin examination sensors and the
10. analysis devices can be replaced by various portable devices. That is, it is apparent that the present invention can be easily employed in not only the skin examination system but also examination systems of other kinds.



## Claims

1. A system for diagnosing and prescribing care for a remote person's skin by the Internet, the system comprising:

5       at least one skin examination system including a plurality of skin examination sensors and an examination module, the skin examination sensors examining a user's skin state and generating skin examination signals, the examination module receiving and processing the skin examination signals;

10       at least one user computer system capable of receiving the skin examination signals and transmitting the skin examination signals through the Internet; and

15       a manager system including a web server which processes requests from users, a database section which analyzes and stores previously inputted user information data and the skin examination data transmitted from the user personal computers, a plurality of the analysis devices which analyze the skin examination signals provided by the examination module, and a plurality of the skin beauty servers which compare and analyze the user information data and the skin examination data, thereby providing the user with information in relation to skin beauty.

20       2. The system for diagnosing and prescribing care for a remote person's skin by the Internet as claimed in claim 1, wherein the skin examination sensors comprise at least one of a moisture measurement sensor for measuring moisture in the skin, a fat measurement sensor for measuring fat in the skin, an elasticity measurement sensor for measuring elasticity of the skin, a melanin-erythema measurement sensor for measuring a degree of melanin and erythema on the skin, a PH measurement sensor for measuring a PH value of the skin, and a  
25       skin magnifier sensor for examining a state of the skin or hair by means of a magnifying lens.

3. The system for diagnosing and prescribing care for a remote person's skin by the Internet as claimed in claim 1, wherein the database section comprises a user information database which contains information about the users, a skin examination database which  
30       contains users' skin examination data provided by the analysis devices, a skin beauty database which contains skin beauty-related information provided by the skin beauty servers, and a synthetic analysis database which contains data obtained by synthetically analyzing the user information database, the skin examination database, and the skin beauty database, thereby providing the users with information about selection of cosmetics, skin beauty management,  
35       and external preparations for skin.

4. A method for diagnosing and prescribing care for a remote person's skin by the Internet, the method being performed by means of a system comprising at least one skin examination system, at least one user computer system, a manager server, and a plurality of analysis devices, the skin examination system including a plurality of skin examination sensors and an examination module, the user computer system including a user personal computer, the examination module processing the skin examination signals from the skin examination sensors, the manager server analyzing, storing, and transmitting data transmitted from the user computer system, the analysis devices being connected with the manager server and converting the skin examination signals to skin examination data, the method comprising the steps of:

(a) connecting the skin examination sensors with the user personal computer, so as to try to connect with the manager server;

(b) judging whether a user is a member of service or not;

(c) requiring the user to join the membership when the user is not a member of the service, and judging whether the user wants to examine user's skin or not when the user is a member of the service;

(d) providing the user with user's manuals about the skin sensors when a request for an examination for user's skin from the user is confirmed;

(e) carrying out the examination for the user's skin according to the user's manuals;

(f) transmitting the skin examination signals to the manager server;

(g) converting the skin examination signals into skin examination data in the analysis devices connected to the manager server;

(h) storing the skin examination data in a database section;

(i) analyzing the skin examination data in the manager server;

(j) determining whether the analyzed skin examination data exceeds a reference value or not;

(k) requiring a re-examination for the skin and providing the user's manuals for the skin sensors again when the analyzed skin examination data exceeds a reference value, and processing and extracting the skin examination data stored in the database section, so as to construct a data warehouse, when the analyzed skin examination data does not exceed a reference value;

(l) incorporating and comparing the skin examination data with existing examination data and analyzing them, so as to extract resultant information data; and

(m) providing the user with the resultant information data.

5. The method for diagnosing and prescribing care for a remote person's skin by the

Internet as claimed in claim 4, wherein, in order to enable the user to join the membership, step c comprising the steps of:

requiring the user to join the membership and providing the user with information in relation to the joining of the membership;

5 determining whether new subscriber information in order to join the membership is inputted or not;

requiring the user again to input the new subscriber information when an input of the new subscriber information is not confirmed, and storing the new subscriber information in the database section when new subscriber information has been inputted;

10 arranging and classifying the new subscriber information data stored in the database section;

comparing and analyzing the arranged and classified new subscriber information data with existing subscriber information data, so as to apply it to a model obtained through factor analysis;

15 predicting the new subscriber's skin type with reference to the applied model;

providing the new subscriber with custom-made information according to the predicted skin type;

determining whether the new subscriber has inputted detail items or not; and

20 providing information about the detail items and storing the detail items again in the database section when an input of the detail items is confirmed, and renewing the model obtained through factor analysis into a new model by incorporating the new subscriber information data with the existing subscriber information data when the input of the detail items is not confirmed.

25 6. The method for diagnosing and prescribing care for a remote person's skin by the Internet as claimed in claim 4, after step c, the method further comprising the steps of:

when a request for skin examination from the user is not confirmed, providing the user with information proper for the user by means of existing skin examination data;

30 determining whether or not the provided information is information which the user wants to get;

allowing the user to purchase goods from various service companies when the information is the information which the user wants to get, and requiring the user to examine various portions of the user's skin again and executing a re-examination of the skin when the information is not the information which the user wants to get;

35 storing data obtained from the re-examination of the skin in the database section; and providing the user with information suitable for the user with reference to the data

stored in the database section, so as to enable the user to purchase goods from various service companies.

7. The method for diagnosing and prescribing care for a remote person's skin by the Internet as claimed in claim 4, in relation to management of the data warehouse, the method further comprising the steps of:

collecting fundamental data, the fundamental data including data collected according to external specialists' opinions, data inputted through the skin examination sensors, data which represent fat content, moisture content, and PH, according to skin types, and data of environmental factors such as season, weather, temperature, and moisture, which have influence on the fat content, moisture content, and PH;

carrying out data mining which includes data extraction, data conversion, data refinement, and data synthesis, on the basis of the collected fundamental data;

constructing a data warehouse by relating the data-mined datas with each other so that the datas can be efficiently controlled and managed;

obtaining a final resultant value through a cross analysis and a discrimination analysis of the datas constructed in the data warehouse;

utilizing information, which includes methods of caring skin and selecting kinds of cosmetics according to the user skin types, in skin care by the users and marketing by manufacturers of cosmetics, with reference to the final resultant value obtained through the above analyses; and

for various users, adding and renewing data, and deleting unnecessary data, so as to store resultant data in the database section.

Fig 1

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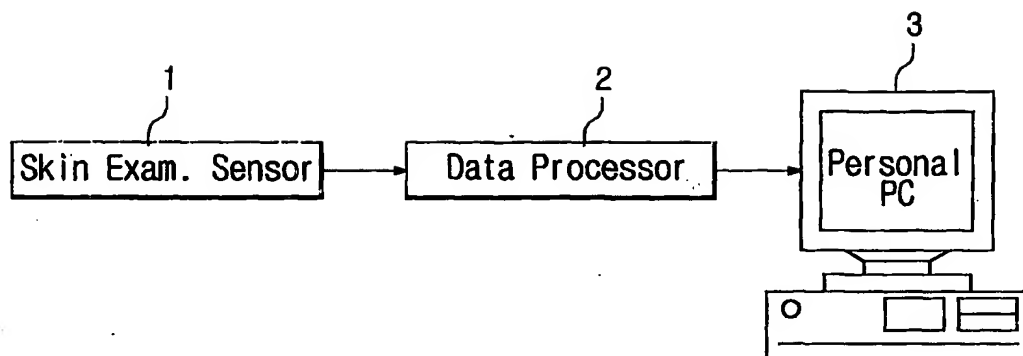


Fig 2

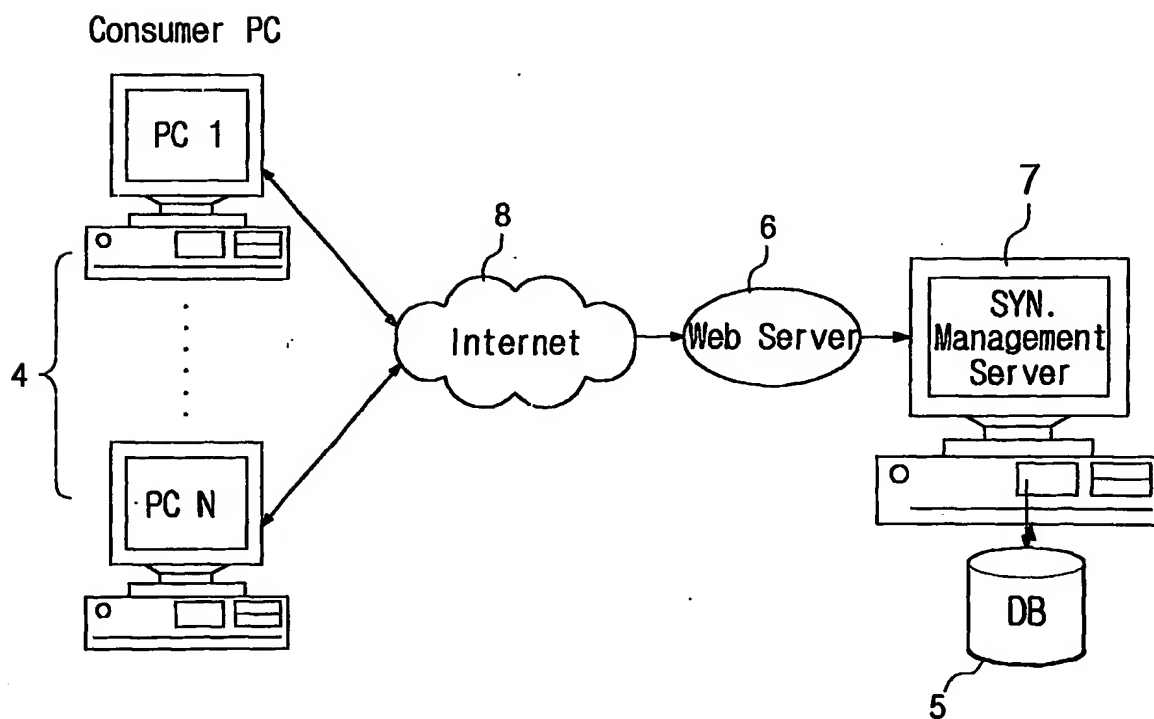
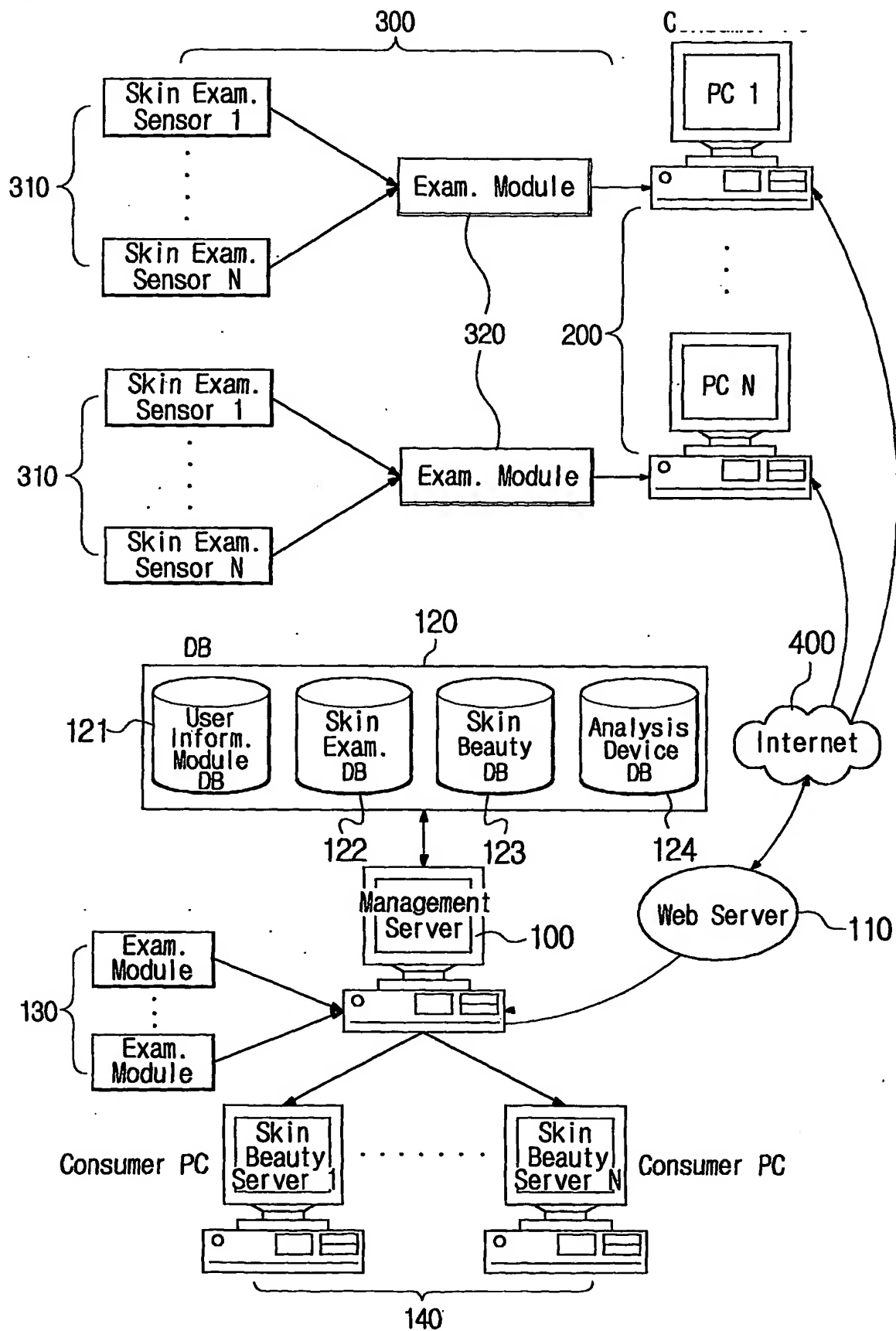


Fig 3

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Fig 4

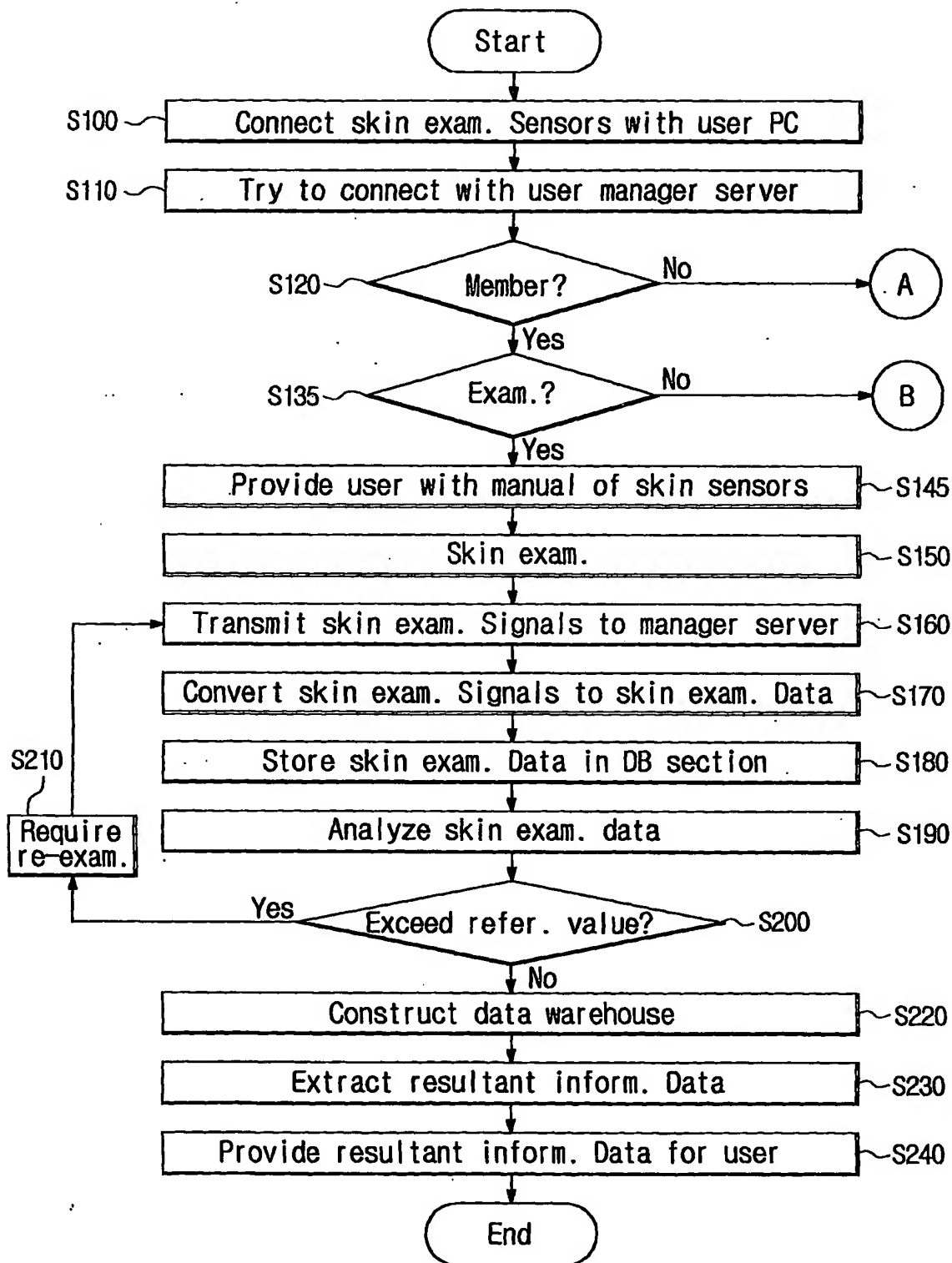


Fig 5

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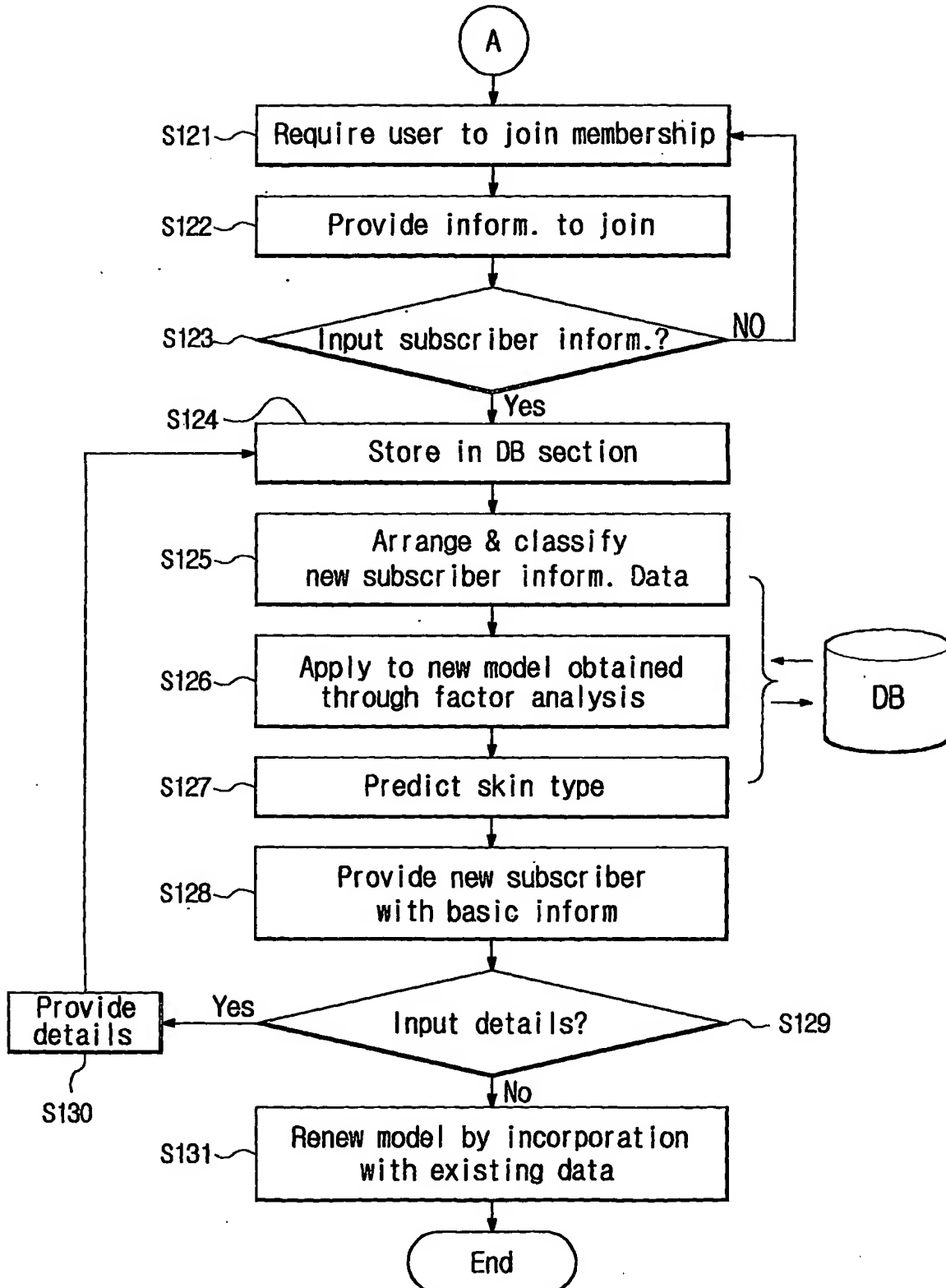




Fig 6

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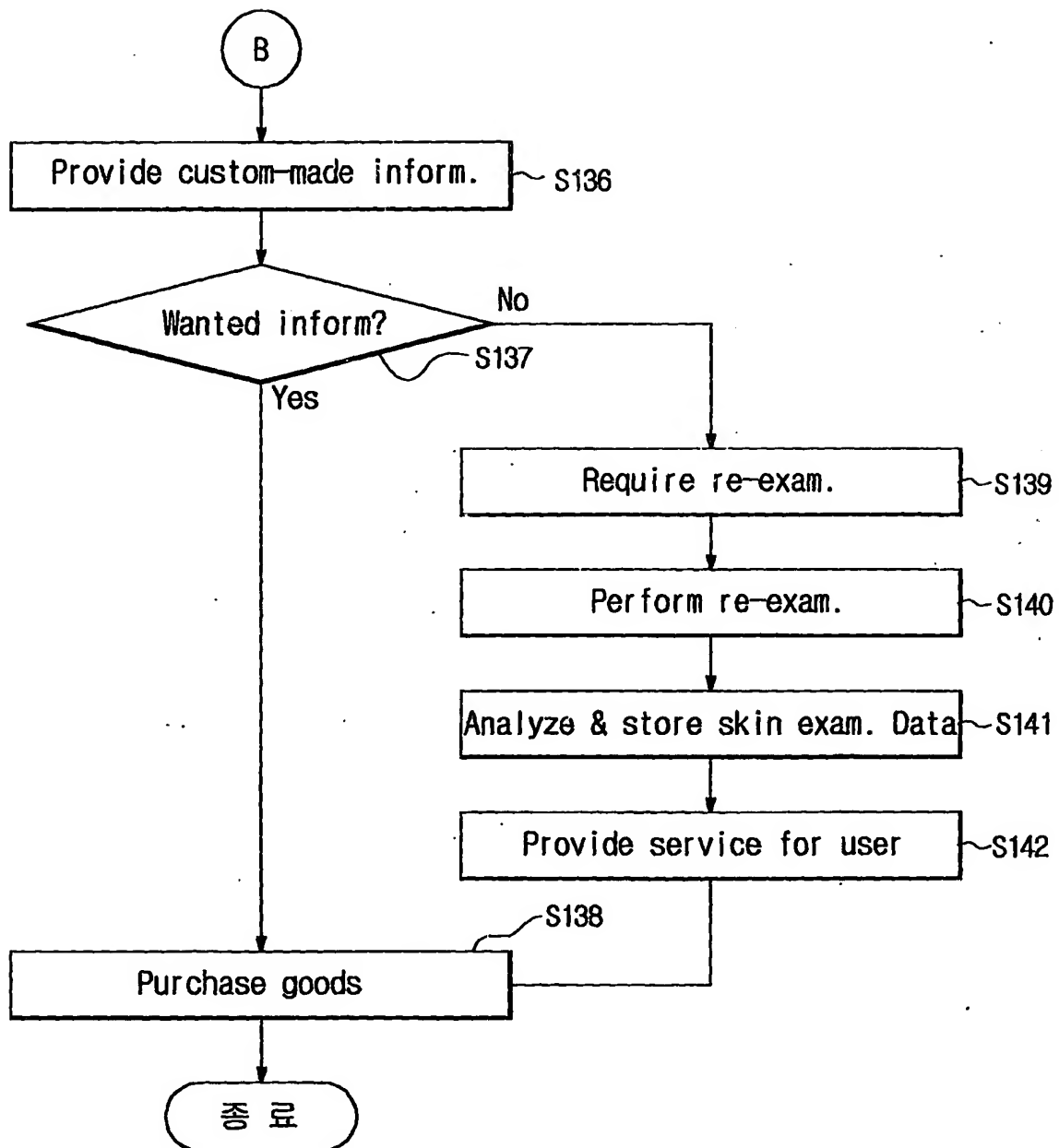
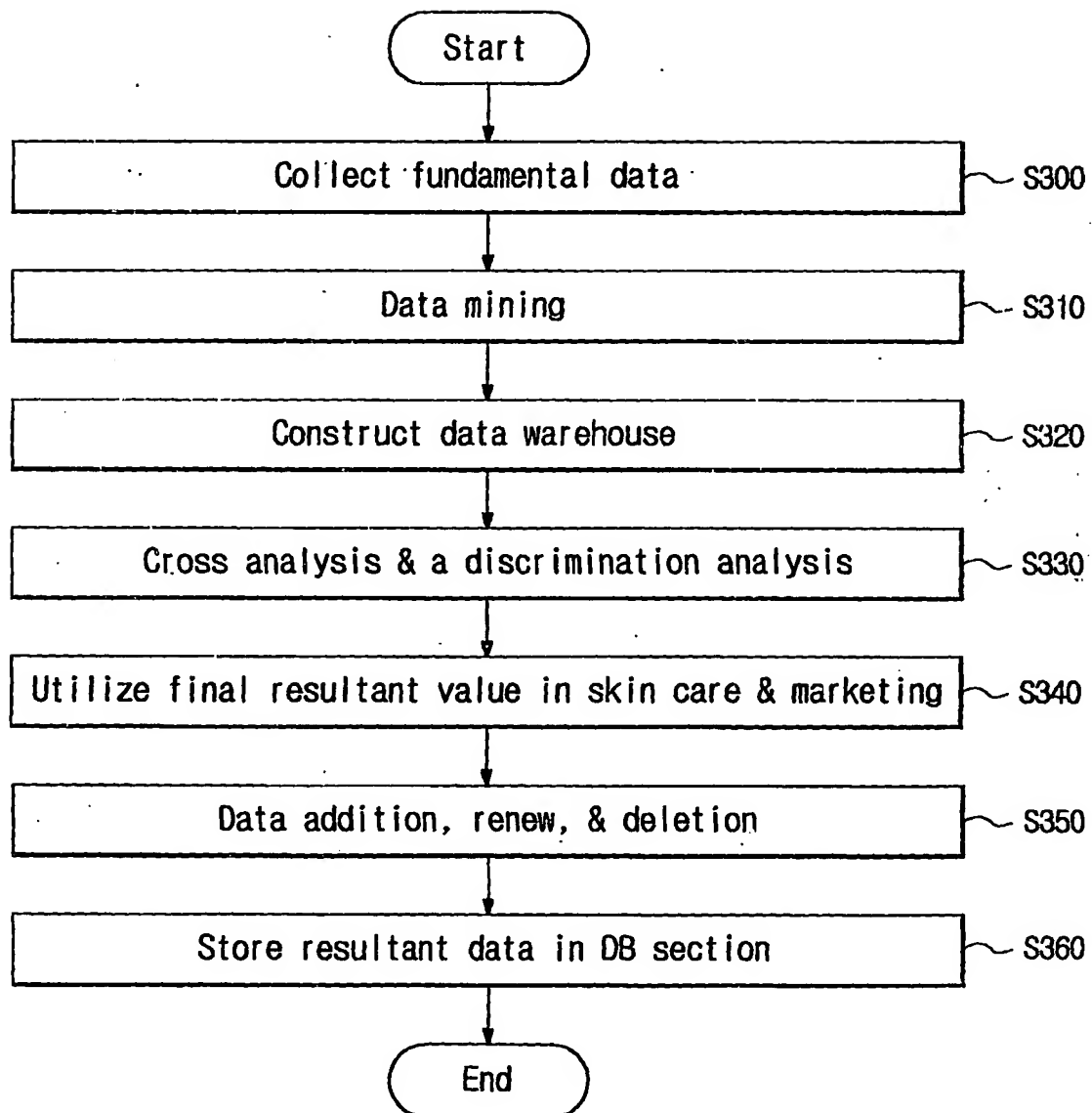


Fig 7

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# INTERNATIONAL SEARCH REPORT

national application No.

PCT/KR02/00475

## A. CLASSIFICATION OF SUBJECT MATTER

IPC7 G06F 19/00

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7 G06F 19/00, G06F 17/60

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Korean Patents and applications for inventions since 1975

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

FPD, PAJ, PATROM

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y,P	KR 2001-110850 A (WON IL) 15. DEC. 2001 (Family None) * Abstracts & Claims.	1-7
Y,P	KR 2001-110838 A (SHT Co., LTD) 15. DEC. 2001 (Family None) * Abstracts & Claims.	1-7
A,P	JP 2001-112741 A (FANCL CORP.) 24. APR. 2001 (Family None) * Abstracts & Claims.	1-7
A	JP 2000-102514 A (INTERNATL UNIV OF HEALTH & WELFARE, HITACHI MEDICAL CORP.) 11. APR. 2000 (Family None) * Abstracts & Claims.	1-7
A	JP 1999-19051 A (NIPPON COLIN Co., LTD) 26. JAN. 1999 (Family None) * Abstracts & Claims.	1-7

☐ Further documents are listed in the continuation of Box C.

☐ See patent family annex.

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"&" document member of the same patent family

Date of the actual completion of the international search

21 MAY 2002 (21.05.2002)

Date of mailing of the international search report

23 MAY 2002 (23.05.2002)

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